

**REMARKS**

**I. Status of Claims**

Claims 1, 3, 4, 8-13, and 16-18 are pending. Claims 2, 5, 6, 7, 14, 15, 19 and 20 were cancelled in a previously filed amendment. Claims 1, 3, 4, 8-13 and 16-18 stand rejected.

**II. Rejections**

The Office continues to reject claims 1, 3, 4, 8-13 and 16-20 under 35 U.S.C. § 103(a) as obvious over U.S. Patent Application Publication No. 2004/0011650 to Zenhausen ("Zenhausen") and WO 02/40874 to Quake ("Quake") in view of U.S. Patent No. 6,743,516 to Murphy ("Murphy") and U.S. Patent No. 5,587,128 to Wilding ("Wilding"). Advisory Action page 2. In particular, the Office alleges that Zenhausen and Quake both teach chlorosilane surface treatments, and that Quake further teaches a hydrophobic surface treatment. *Id.* The Office concedes that neither Quake nor Zenhausen teach a microchannel having a wall decorated with triethylchlorosilane. *Id.* Nonetheless, the Office alleges that Wilding establishes that trimethylchlorosilane was a well known in the art as a surface treatment, and alleges that Murphy establishes that triethylchlorosilane as functionally equivalent to trimethylchlorosilane because Murphy teaches that both are hydrophobic surface coatings. *Id.* Applicants respectfully disagree.

The Office bears the initial burden of factually supporting any *prima facie* conclusion of obviousness. See M.P.E.P. § 2142. In *KSR Int'l Co. v. Teleflex Inc.*, 82 U.S.P.Q.2d 1385 (2007), the Supreme Court confirmed that the "framework for

applying the statutory language of §103" is still based on its landmark decision in *Graham v. John Deere Co. of Kansas City*, 148 U.S.P.Q. 459 (1966). As articulated in *KSR*, part of this evaluation involves determining "whether there was an apparent reason to combine" the prior art elements relied upon to establish obviousness. 82 U.S.P.Q. 2d at 1369. The inquiry is not whether each element existed in the prior art, but whether the prior art made obvious the invention as a whole. *Hartness Int'l, Inc. v. Simplimatic Eng'g Co.*, 2 USPQ2d 1826, 1832 (Fed.Cir.1987). In order to avoid inappropriate hindsight, the Office must establish that the claimed invention as a whole would have been obvious at the time the invention was made. M.P.E.P. § 2141.01.

Here, the Office has failed to identify any reason why one of skill in the art would have chosen trimethylchlorosilane among the various surface treatments disclosed in Wilding, let alone why, after identifying trimethylchlorosilane, the skilled artisan would have then chosen to further modify this to triethylchlorosilane, as recited in the present claims.

Indeed, Wilding discloses numerous surface treatments for passivation, including a long list of silanization agents, several lists of polymer coatings, a list of various blocking agents, and various means of forming silicon oxide films on the surface of the device. The Office has not explained why, among those many choices for passivating the surface of a DNA amplification device, the skilled artisan would have chosen trimethylchlorosilane as a starting point for deriving a surface treatment for the specific microchip and/or nucleic acid extraction kit recited in the present claims.

Moreover, Murphy fails to establish the functional equivalence of trimethylchlorosilane and triethylchlorosilane as surface decorating agents. Thus, even

if arguendo, the skilled artisan would have had reason to select trimethylchlorosilane from Wilding, Murphy is of no benefit in suggesting the replacement of trimethylchlorosilane with triethylchlorosilane. Murphy discloses the combined deposition of silicon tetrachloride and trimethylchlorosilane onto a glass surface in order to create a hydrophobic surface coating on the glass surface. However, Murphy never discloses a similar use for triethylchlorosilane. Indeed, triethylchlorosilane is never deposited onto the surface of a glass substrate. Thus, Murphy never teaches a surface decorated with triethylchlorosilane, let alone a microchannel having an inner wall surface decorated with triethylchlorosilane, as recited in the present claims.

Instead, Murphy only discloses triethylchlorosilane as a capping agent for a tetrachlorosilane/trimethylchlorosilane coating deposited onto the surface of the substrate. Because trimethylchlorosilane and triethylchlorosilane are disclosed for two distinct purposes in Murphy, that reference does not establish that a skilled artisan having identified trimethylchlorosilane as a possible surface decoration agent, would have had a reason to replace trimethylchlorosilane with triethylchlorosilane for the decoration of an inner wall surface of a microchannel.

Finally, even if arguendo, Murphy does suggest that trimethylchlorosilane and triethylchlorosilane are functionally equivalent, the combination of Zenhausern, Quake, Wilding and Murphy fails to establish a prima facie case because Murphy is non-analogous art. M.P.E.P. § 2141.01(a). According to the Office, "Zenhausern, Quake, Wilding and Murphy are interested in surface coating" and "[t]herefore, one interested in solving a problem related to surface coatings would look to any teaching of surface

coatings and in the instant case, hydrophobic surface coatings.” Applicants respectfully disagree.

The present invention is directed to a microchip comprising microchannels, and a kit comprising a microchip having microchannels that may be used for extracting nucleic acid. Similarly, Zenhausem is directed to microfluidic devices for manipulating polarizable analytes via electrophoresis, Quake is directed to microfluidic devices for conducting assays and high-throughput screening, and Wilding is directed to a microfluidic device for amplifying polynucleotides. Murphy, on the other hand, is directed to coatings applied to automobile window glass. Thus, Murphy is directed to an art unrelated to both the instant application and the other cited prior art references.

Moreover, the present application, Zenhausem and Wilding only discuss the specific challenge of coating the surface of a microchip having microchannels, a problem far removed from the field of art with which Murphy is related. Indeed, the present application makes clear that any information provided by Murphy regarding surface coating is not applicable to the challenges faced in decorating an inner wall of a microchannel. In particular, the present application notes that “dust generated in the surface decorating process of not the microchannel, but a flat substrate such as a slide glass can be washed away by a solvent without generating a problem. However, the dust generated in the process of the inner wall of the microchannel cannot be easily washed out. When a check structure is provided in the microchannel, the dust can be especially hardly removed.” paragraph [0043]. Accordingly, the skilled artisan would not have looked to Murphy for teachings related to the development of the instantly

claimed microchips and kits, and the Office cannot properly rely on Murphy in establishing a prima facie case of obviousness.

For the above reasons, Applicant respectfully requests the withdrawal of the current rejection and allowance of the claims.

### **III. Conclusion**

In view of the foregoing remarks, Applicants respectfully request reconsideration of this application and the timely allowance of the pending claims.

Please grant any extension of time required to enter this Amendment and charge any additional required fees to Deposit Account 06-0916.

Respectfully submitted,

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